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A STUDY OF MATERIAL CONTROL STRATEGIES IN SOME SELECTED CONSTRUCTION FIRMS IN NIGERIA

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ABSTRACT
This research assesses the various strategies utilized by building construction firms for controlling materials on construction sites with a view to identifying the stages of project execution where adequate control should be given to materials as well as assessing the impact of strict compliance by building construction firms with standard material control strategies on building project delivery. Data were collected with the aid of well-structured questionnaire administered on a number of construction professionals in some randomly selected building construction firms in South Western Nigeria. The data generated were further analyzed using descriptive statistics. The study showed that the recognition of material control practice and implementation of the strategies involved by building construction firms would ensure timely project execution and standard work delivery within reasonable cost, time and quality. Based on the findings, it was recommended among others, that there should be a proper planning of material control right from the inception of project execution and it should be practised on all sites and by all categories of building construction firms in strict compliance with the recognized strategies.

KEYWORDS: Standard material control strategies; Recognition; Implementation; Cost; Time; Quality; Strict compliance.

INTRODUCTION

The construction industry refers to the organized economic activity involving assembling materials, labour and other resources and managing all these inputs towards achieving desired goals (Ojo, 2005).

Therefore, considering the significant position of the construction industry in the nation's economy, there is a need for improved efficiency, quality, productivity, administration and management of construction activities with adequate solutions to the set backs and problems confronting the industry (Ogunsemi and Aje, 2005).

Material control, according to Omotosho (2006) is of central importance to the economic health of the construction industry. Material component in construction can be regarded as any item that is permanently fixed in position as a component of the final product (Olubodun, 1989). Material is a very significant construction input, most particularly in building. Shortage of and defects in, materials for construction works is a major contributor to equipment down times and the loss of labour productivity on building sites, thus causing astronomical rise in construction cost as opined in Olubodun (1989).

The cost of materials has been identified to constitute a major cost on the cost of construction by various authors. Olubodun (1989) established that the material contents for building usually range between 45% and 60% of total cost. Meanwhile, Ene (1997) noted that the cost of materials accounts for between 60% and 70% of total construction cost while Mezue (1992) stressed that the cost of materials has been put at an average of 65% of contract sum. Ayeni (1986) and Wahab (1996) cited in Omotosho (2006) ranged it between 50% and 60% of the overall cost of all the resources that go into construction. Ojimelekwe and Agbo (1999) emphasized that in 1980 in Nigeria, materials component in a traditional building was about 60% of the building cost; in contrast, the labour cost was estimated at about 20% while profit and overheads contributed to the remaining 20%. Therefore, in order to optimize the cost of construction, it is expedient that proper flow of materials must be maintained on construction sites to avoid excessive wastage and save idle time (Mezue, 1992).

However, according to Omotosho (2006), material control is the proper management of material component in construction so that the quantities required for a particular operation are used without excessive waste. On the other hand, Ojimelekwe and Agbo (1999) maintained that material control strategy is a planned action or procedure that

incorporates the use of operational bills for materials requisition and monitoring; planning and organization of construction sites to enhance transportation flow; quality control and security; specific education of the operatives and the use of appropriate incentive schemes which could go a long way in reducing waste on construction sites. It was further stressed that such a strategy would increase the profitability of a building contract and in the long run reduce the cost of executing a building project (Ojimelekwe and Agbo, 1999).

Meanwhile, materials can be identified and checked before and after they are used in the works. As documented in Omotosho (2006), the common methods or strategies for controlling materials on construction sites are as follows: Site planning and organization; materials scheduling and procurement; stock control and storage techniques; materials movement and handling; quality control and checking; security measures; site communication; education and incentive schemes, as well as good supervision.Therefore, the study of material control strategies in the building construction industry may have a significant impact on improving the economic well-being of the industry in particular and the whole nation at large.

Theoretical Background

Hornby (2006) defined "strategy" as a plan that is intended to achieve a particular purpose. Basically, according to Omotosho (2006), material control is the proper management of material component in construction so that the quantities required for a particular operation are used without excessive waste. On the other hand, Mezue (1992) further enlightened that material control strategy is a planned action or procedure for proper flow of materials which must be maintained on construction sites to avoid excessive wastage and save idle time.

Materials in construction terms refer to those resources which are employed in one form or the other in the erection and development of infrastructures. According to Opara (1999), materials are a mixture of processed or unprocessed minerals or compounds used in engineering construction and these include cement, sand, gravel, granite etcetera.

However, Ojimelekwe and Agbo (1999) highlighted a three-pronged approach for reduction of the cost of building as effective through material:

- Realistic design and modular co-ordination of dimensions that take into consideration the sizes of the materials available in the markets.
- Substitution of imported materials with locally sourced materials that will perform the same function without adversely affecting the value of the building cost.
- Material control strategies that will ensure that the materials purchased are correctly incorporated into the works.

Meanwhile, materials can be identified and checked before and after they are used in the works. According to Omotosho (2006), Ojimelekwe and Agbo (1999), the following have been documented as the procedure or strategies for controlling materials on construction sites: Site planning and organization; Materials scheduling and procurement; Stock control and storage techniques; Materials movement and handling; Quality control and checking; Good security measures; Site communication; education and incentive schemes; and Good supervision. These strategies must be strictly observed or implemented in project execution to avoid excessive waste and save idle time (Mezue, 1992).

Furthermore, Omotosho (2006) opined that material control covers design, specification, procurement, packing and transportation, stocking, handling, usage and protection. Sulaiman (1999) asserted that material control occurs at every stage of project execution. Meanwhile, Omotosho (2006) documented the following stages of project execution as periods when specific level of control should be given to materials: During planning and designing; During material delivery and storage; During construction activities; as well as After practical completion of project and before handing over. These stages are used as a factor to describe and assess material control in all phases of project execution (Omotosho, 2006).

The Problem

Construction projects in Nigeria are generally characterized by cost and time overrun, substandard work, disputes and abandonment, emanating from improper control of materials and ineffective implementation of the various

strategies for controlling materials on construction sites (Omotosho, 2006). Today, the control of materials on construction sites is handled carelessly by planning and purchasing departments as well as site supervisors and engineers of contractor's organization. Also, ineffective implementation of various strategies for controlling materials on sites by appropriate personnel in the contractor's team may lead to excessive expenditure on materials above the client's/contractor's budgeted cost (Omotoso, 2006). Improper control of materials on construction sites has been posing various problems to contractors in realizing reasonable profit margin. The cost of improper control of materials is borne by the contractor. However, Omotosho (2006) further stressed that the higher the level of improper control of materials on sites and non-compliance or inadequate compliance with the control strategies involved, the higher the loss to the contractor in terms of profit making.

Abiodun (2002) revealed that it is not only the contractors that bear the brunt of losses through improper control of materials and ineffective implementation of the control strategies involved; the suppliers sometimes bear the brunt. For instance, a number of cement bags, blocks, bricks, tiles etcetera which may be rejected due to mishandling when loading from the source and offloading on site will affect the supplier's profit. Also, in the case of labour – only type of contract where the client supplies all materials to the site and the contractor only gets paid for the labour provided, client will be the one to bear the loss.

Moreover, effective control of materials which can be delivered through effective implementation of the control strategies involved as applied to the stages described in this study will go a long way in reducing waste, construction delay, dispute, avoiding substandard work and abandonment so that projects can be executed and completed within reasonable time, cost and to the required quality standard, thereby ensuring value for money for the client.

Objectives of the study

The objectives of this study are to:

1. assess the various strategies utilized by building construction firms for controlling materials on construction sites.
2. identify the stages of project execution where adequate control should be given to materials.
3. assess the impact of strict compliance by building construction firms with standard material control strategies on building project delivery.

METHODOLOGY

The study was carried out between May, 2010 and September, 2010 mainly by means of "Questionnaire". Data were collected with the aid of well-structured questionnaires which provided a set of alternative responses from which the respondents selected. The population of this study was made up of construction professionals in the Nigerian building construction industry, but it was not practicable to study the building construction industry in Nigeria in its totality in the situation which was investigated, hence a sample of the population was taken. The sampling technique adopted for this study was the multi-stage but simple random sampling was used at each stage. The study was carried out by administering well-structured questionnaires on selected construction professionals (Builders, Quantity Surveyors and Engineers) of forty-eight (48) randomly selected building construction firms in three different categories viz: small, medium and large size, located in Lagos, Oyo, Osun, Ogun and Ondo States of South Western Nigeria. A total of one hundred and ten (110) questionnaires were administered and 86 were returned and used for analysis. This represented a return rate of 78 percent and was considered adequate. Meanwhile, the questionnaires were validated before administration on respondents. This was done by sending copies of the questionnaire to experts and senior colleagues for assessment in order to ensure that the instrument measured the quality which the research was designed to measure. The comments made, helped the questionnaire not only to have face validity but also content validity.

Most of the questions asked required quantitative answers using a 5-point scale, typical of the "Likert Scale" of 1 for "not frequent", 2 for "less frequent", 3 for "frequent", 4 for "very frequent" and 5 for "most frequent". The data generated were analyzed using descriptive statistical tools such as percentages, mean/averages, frequencies and mean score ranking respectively.

RESULTS

Table 1: (a) Demographic Characteristics of the Respondents

Variable	Freq	Freq cum	%	% cum
1. Designation of the Respondents (N = 86)				
• Builder	30	30	35	35
• Quantity Surveyor	20	50	23	58
• Structural Engineer	16	66	19	77
• Mechanical Engineer	12	78	14	91
• Electrical Engineer	8	86	9	100
2. Academic Qualifications of Respondents (N = 86)				
• HND	34	34	40	40
• B.Sc	32	66	37	77
• PGD	12	78	14	91
• MSc	8	86	9	100
3. Professional Qualifications of Respondents (N = 86)				
• NIOB	30	30	35	35
• NIQS	20	50	23	58
• NSE	36	86	42	100
4. Years of Experience of Respondents (N = 86)				
Years	Freq (f)	(%)	x	Fx
• 1 – 5	9	(10)	3	27
• 6 – 10	16	(19)	8	128
• 11 – 15	35	(41)	13	455
• 16 – 20	20	(23)	18	360
• 21 – 25	6	(7)	23	138
Total	86	(100)		1108
Mean ≈ 13 years				

B Demographic Characteristics of the Building Construction Firms						
S/N	Variable	Freq	Freq.cum	%	% cum	Staff Capacity
5.	Size of the Firm (N = 48)					
•	Small size	14	14	29	29	<25
•	Medium size	16	30	33	62	>25<50
•	Large size	18	48	38	100	>50<500

6. Years of Work Experience of the Firms (N = 48)					
	Years	Freq (f)	(%)	x	Fx
•	1 – 5	4	(8)	3	12
•	6 – 10	9	(19)	8	72
•	11 – 15	11	(23)	13	143
•	16 – 20	14	(29)	18	252
•	21 – 25	10	(21)	23	230
	Total	48	(100)		709
Mean ≈ 15 years					

The data collected for the study consisted of primary data collected via structured questionnaire administered on construction professionals (Builders, Quantity Surveyors and Engineers) in forty-eight (48) randomly selected building construction firms in South Western Nigeria. The preliminary section of the questionnaire relates to the demographic background of both the respondents and the construction firms as presented in table 1. Respondents on

this study are top management or senior technical staff with vast knowledge and experience in material management. Majority of the respondents are Engineers (42%) employed in various capacities such as Project managers, Site Engineers, Plant managers and Stock controllers / Inventory control managers. Builders (35% of the respondents) are next and employed as Site supervisors, Site Engineers and Stock controllers / Inventory control managers. The least on the table are Quantity Surveyors (23% of the respondents) also engaged as Project managers, Contract managers and Site Quantity Surveyors. Basically, 40% of the respondents are HND holders while 37% of the them are BSc holders. Meanwhile, 42% of the respondents are professionally qualified with the Nigerian Society of Engineers (NSE), while 35% of them are qualified with the Nigerian Institute of Building (NIOB), and 23% of them with the Nigerian Institute of Quantity Surveyors (NIQS). Years of experience of these respondents in the building construction industry were examined and the results showed that the average number of years of experience of all the 86 respondents surveyed is 13 years as can be seen on table 1a. Also, the average number of years of work experience of all the 48 firms surveyed is 15 years and the demographic characteristics of the firms in respect of staff capacity was presented on table 1b. Hence, it can be inferred that the data obtained for analysis are reliable enough to form a good basis for this research work as can be seen from the qualities of the respondents and firms in terms of their vast experience in material control practice. Moreover, the assessment of the variables presented in tables 2, 3 and 4 was carried out with the aid of mean score ranking method.

Results emanating from this study are now presented as follows:

- The most frequently utilized strategies for controlling materials on construction sites as identified, confirmed and arranged in ranking order are site planning and organization; materials scheduling and procurement; materials movement and handling; good supervision and good security measures. Others which include stock control and storage techniques; quality control and checking; site communication as well as education and incentive schemes are just frequently utilized strategies mostly by the large construction firms surveyed.
- Adequate control is given to materials mostly during construction activities and during material delivery and storing by the construction firms surveyed. Both stages are identified and confirmed as most important while other stages which include during planning and designing as well as after practical completion and before hand over are just important.
- The nine most important factors strongly agreed as impact of strict compliance by construction firms with standard material control strategies on building project delivery include minimized delay; less dispute; avoidance of project abandonment as much as possible; effective project planning, scheduling, monitoring and control; high construction quality and productivity; time overrun avoided or minimized as much as possible; cost overrun avoided or minimized as much as possible; increase in contractor's overhead cost. Other factors are agreed to be less important.

DISCUSSION

Materials Control Strategies

Table 2 shows the analysis of the strategies utilized by building construction firms for controlling materials on construction sites from the respondents' (construction professionals') view points.

The analysis revealed that all the strategies identified and confirmed by the respondents were strongly agreed upon by them as frequently utilized methods for material control based on the mean item scores on the table which are very close to one another. Hence, this implies that the strategies involved are all considered important and confirmed as standard material control methods arranged in ranking order. These include Site planning and organization; Material scheduling and procurement; Material movement and handling; Good supervision; Good security measures; Stock control and storage techniques; Quality control and checking; Site communication; and Education and incentive schemes.

Each of these strategies agreed with submissions in (Omotosho, 2006; Ojimelekwe and Agbo, 1999 and Mezue, 1992), as stressed in the theoretical background.

Table 2: Strategies utilized for controlling materials on construction sites as perceived by the respondents.

		Respondents' score									
S/NO	Indentified Strategies		MF	VF	F	LF	NF	N	ΣFX	Mean score	Rank
		X=	5	4	3	2	1			X	
1.	Site planning and organization	F	72	12	2	-	-	86	414	4.81	1
2.	Materials Scheduling and procurement	F	70	14	2	-	-	86	412	4.79	2
3	Materials movement and handling	F	70	10	5	1	-	86	407	4.73	3
4.	Good supervision	F	70	10	5	1	-	86	407	4.73	3
5.	Good security measures	F	70	10	5	1	-	86	407	4.73	3
6.	Stock control and storage techniques	F	62	12	8	4	-	86	390	4.53	6
7.	Quality control and checking	F	62	12	8	4	-	86	390	4.53	6
8.	Site communication	F	62	12	8	4	-	86	390	4.53	6
9.	Education and Incentive Schemes	F	56	10	12	6	2	86	370	4.30	9

5 = Most Frequent (MF); 4 = Very Frequent (VF); 3 = Frequent (F); 2 = Less Frequent (LF); 1 = Not Frequent (NF), X = Mean item score (MIS); F = Frequency/Respondents' score; X = Weighting; N = Total Number of Respondents (86).

Strategies ranked between1-3 were confirmed by the respondents as most frequently utilized for material control on construction sites, owing to the fact that their mean item scores (4.81, 4.79and 4.73 respectively) are very close 5.00 meaning "most frequent" on the 5-point rating interval scale used.

So also, other strategies ranked between 6-9 were confirmed as very frequently utilized methods owing to the fact that their mean item scores (4.53 and 4.30 respectively) are slightly above 4.00 meaning "very frequent" on the 5-point rating interval scale used.

Moreover, stock control and storage techniques in conjunction with quality control and checking, site communication as well as education and incentive schemes are very frequently utilized strategies for controlling materials on construction sites to a reasonable extent on large construction sites and by large construction firms more than others as documented in Adafin (2008). The applicability and suitability of the strategies can influence on-site productivity as they are vital to productivity and construction success (Adafin, 2008).

Materials Supply Frequency

Table 3 shows the analysis with respect to assessing the frequency of material supply on construction sites from the respondents' view points.

Meanwhile, the analysis above revealed that materials are most frequently supplied to the right place; in the right quantity; and in the right quality according to bills of quantities, materials schedule and specification. It was deduced that supply of materials by suppliers at the right time; and at the right price is not frequently achieved. This is evidenced in Olubodun (1989) that majority of construction firms in the building construction industry initiate purchasing at the post-contract stage and only when the need arises, also purchasing is very highly decentralized among the firms. However, the researcher is of the opinion that the analysis is at a little variance with a submission in Inyang-Udoh (2002) that most materials are not usually supplied to sites in the right quantity and at the right time; so also they are not necessarily brought and stocked on sites when prices are low but when the need

Table 3: Assessment of the frequency of materials supply on construction sites as perceived by the respondents.

		Respondents' Score									
S/No	Identified Factors		MF	VF	F	LF	NF	N	ΣFX	Mean Score	Rank
		X=	5	4	3	2	1			(X)	
1	Right place	F	76	10	0	0	0	86	420	4.88	1
2	Right Quantity	F	70	14	2	0	0	86	412	4.79	2
3	Right Quality	F	68	12	4	2	0	86	404	4.70	3
4	Right Time	F	0	0	0	12	74	86	98	1.14	4
5	Right Price	F	0	0	0	12	74	86	98	1.14	4

5 = Most Frequent (MF); 4 = Very Frequent (VF); 3 = Frequent (F); 2 = Less Frequent (LF); 1 = Not Frequent (NF), X = Mean item score (MIS); F = Frequency/Respondents' score; X = Weighting; N = Total Number of Respondents (86).

arises for their use on sites. This analysis implies that materials are most frequently supplied to the right place, in the right quantity and in the right quality owing to the fact that the mean item scores (4.88, 4.79 and 4.70 respectively) are very close to 5.00 meaning "most frequent" on the 5-point rating interval scale used. So also, the supply of materials by suppliers at the right time and right price not frequently achieved is owing to the fact that the mean item scores (1.14 and 1.14 respectively) are slightly above 1.00 meaning "not frequent on the 5-point rating interval scale used.

Cross-checking and Verifying Standard of Materials

Table 4 shows the analysis of the attitude of contractors' organizations towards cross-checking and verifying standard of materials delivered to sites from the respondents' view points.

Table 4: The Attitude of an organization towards cross-checking and verifying standard of materials delivered to sites as perceived by the respondents.

Variables	Responses	% Response
Never	0	0.0
Occasionally	8	9.3
Often	25	29.1
Very often	0	0.0
Always	53	61.6
Total	86	100.00

The analysis indicates the view of the respondents regarding the attitude of the construction firms towards cross-checking and verifying standard of materials delivered to their sites. 61.6% of the respondents agreed that standard of materials delivered to sites is always cross-checked and verified, while 29.1% of them held the view that standard of materials is often cross-checked and verified. From this, it was deduced that cross-checking and verifying standard of materials delivered to sites is paramount to achieving good material control.

Stages of Project Execution for Adequate Material Control

The mean scores and ranks of the stages of project execution where adequate control should be given to materials are shown in table 5. The identified stages include during construction activities; during material delivery and storing; during planning and designing; and after practical completion and before handover. These responses revealed that adequate control should be given to materials both during construction activities as well as during material delivery and storing. Both stages have mean item scores very close to 5.00 meaning "most important" on the 5-point rating interval scale used. Other stages are equally important having mean item score slightly above 4.00 meaning "very important on the 5-point rating interval scale used. This analysis agreed with a submission in Omotosho (2006) that material control covers design, specification, procurement,

Table 5: Stages of project execution where adequate control should be given to materials as perceived by the respondents.

		Respondents Score									
S/No	Identified stages		MI	VI	I	LI	NI	N	ΣFX	Mean Score	Rank
		X=	5	4	3	2	1			(X)	
1	During construction activities	F	72	12	2	0	0	86	414	4.81	1
2	During material delivery and storing	F	68	12	4	2	0	86	404	4.70	2
3	During planning and designing	F	56	8	14	4	4	86	366	4.26	3
4	After practical completion and before hand over	F	56	8	14	4	4	86	366	4.26	3

5 = Most Frequent (MF); 4 = Very Frequent (VF); 3 = Frequent (F); 2 = Less Frequent (LF); 1 = Not Frequent (NF), X = Mean item score (MIS); F = Frequency/Respondents' score;, X = Weighting; N = Total Number of Respondents (86).

packaging and transportation, stocking, handling, usage and protection. Also, Sulaiman (1999) asserted that material control occurs at every stage of project execution, while Bamisile (1998) acknowledged that proper control of materials requires controlled supervision at every stage of project execution where trades foremen and supervisors should be encouraged to work together as a team with full cooperation.

Standard Material Control Strategies and Building Project Delivery

Table 6 shows the analysis of factors identified as impact of strict compliance by construction firms with standard material control strategies on building project delivery from the respondents' view points. The analysis revealed that the most important factors (based on the ranking of the mean item scores MIS) identified and confirmed by the respondents as impact of strict compliance by construction firms with standard material control strategies include minimized delays; less disputes; project abandonment avoided as much as possible; effective project planning, scheduling, monitoring and control; high construction quality and productivity; time overrun minimized; cost overrun minimized; increase in contractor's profit margin; and reduction in contractor's overhead cost. This also agreed with a submission in Inyang-Udoh (2002) that strict compliance with material control strategies would contribute in no small measure to reducing material shortages and wastages, and would also go a long way in minimizing delays, disputes and reducing site costs that are normally associated with such delays on sites.

Table 6: Impact of strict compliance by construction firms with standard material control strategies on building project delivery as perceived by the respondents.

		Respondents' Score									
S/N	Identified factors (Impact)		SA	A	N	D	SD	N	ΣFX	Mean score	Rank
		X=	5	4	3	2	1			(X)	
1	Delays minimized	F	68	8	6	4	-	86	398	4.63	1
2	Less disputes	F	62	12	4	8	-	86	386	4.49	2
3	Project abandonment is avoided as much as possible	F	60	10	10	6	-	86	382	4.44	3
4	Effective project planning, scheduling, monitoring and control	F	61	9	10	5	1	86	382	4.44	3
5	High construction quality and productivity	F	61	9	10	5	1	86	382	4.44	3
6	Time overrun minimized	F	61	9	10	5	1	86	382	4.44	3
7	Cost overrun minimized	F	61	9	10	5	1	86	382	4.44	3
8	Increase in contractor's profit margin	F	61	9	10	5	1	86	382	4.44	3
9	Reduction in contractor's overhead cost	F	61	9	10	5	1	86	382	4.44	3
10	Decrease in financial risks on the contractor's firm	F	56	10	12	6	2	86	370	4.30	10
11	Project is completed in accordance with the client's materials budgeted cost.	F	56	8	14	4	4	86	366	4.26	11

5 = Strongly Agreed (SA); 4 = Agreed (A); 3 = Neutral (N); 2 = Disagreed (D); 1 = Strongly Disagreed (SD)
X = Mean item score (MIS); F = Frequency/Respondents' score; X = Weighting; N = Total Number of Respondents (86).

Moreover, according to Fakolujo (2006), strict compliance with material control strategies often leads to effective project planning, scheduling, monitoring and control, high construction quality and productivity, minimized cost and time overruns, thereby increasing contractor's profit margin and reducing contractor's overhead cost. This was further corroborated by Omotosho (2006) that increase in contractor's profit margin and decrease in financial risks on the contractor's firm are partly the major attributes of strict compliance with material control strategies; so also project will be completed in accordance with the client's materials budgeted cost.

The analysis revealed that the factors identified and confirmed by the respondents are highly important based on the mean item scores on the table which are very close to one another, and are also above 4.00 meaning "agreed" on the 5-point rating interval scale used. Hence, this implies that all the factors involved are agreed to be important and confirmed as impact of strict compliance by construction firms with standard material control strategies on building project delivery. The ranking only shows that some factors are more important than others.

RECOMMENDATIONS

Having discussed material control and the impact of strict compliance by construction firms with the standard material control strategies on building project delivery; in view of the findings of the study, the following recommendations are made towards the achievement of high level of compliance with the recognized material control strategies in the building construction industry.

- Material control should be practised on all sites and by all building construction firms, whether large, medium or small, in strict compliance with the strategies involved, to ensure good accounting system in all firms which would in turn lead to the growth of these firms.

- There should be a proper planning of material control right from the inception of project execution to ensure timely project execution and standard work delivery within reasonable cost, time and quality.
- Since material supply at the right time and at the right price is not always achieved which indicates low performance of most materials suppliers; supply order should be given out in good time, in recognition of well assessed lead time so as to eliminate or minimize delays in construction activities due to inability to supply materials at the right time. Meanwhile, proper market survey should be carried out by the purchasing department to ensure that invoice prices are properly checked against order prices.
- More attention should be given to material control during planning and designing stage of project execution/delivery because right from this stage, unwanted specification of materials in conjunction with design programme, would have been eliminated.
- Incoming materials delivered to site should be inspected to enhance material control. Such inspection can be done in the laboratory unit on site by the supervising staff or off-site. This will reduce procurement of defective materials, thus reducing construction cost.
- To effectively achieve the objective of material control strategies in reducing shortages and wastages on sites, a thorough and complete overhaul of all the strategies identified and described in this study should be carried out. If this is done, it would contribute in no small measure to reducing material shortages and wastages on construction sites and would also go a long way to minimize delays and reduce site costs normally associated with such delays on sites. Hence, all categories of building construction firms, whether large, medium or small, should comply strictly with the standard material control strategies in order to minimize delays, disputes, avoid project abandonment as much as possible, achieve effective project monitoring and control, high construction quality and productivity as well as minimize cost and time overrun as much as possible.

CONCLUSION

This study provided enough research from which reliable opinion and conclusion could be drawn. From the analysis of the investigation carried out and findings made; the study revealed that though, all construction firms acknowledge the need for material control on sites but it is carried out to a reasonable extent only on large construction sites and by large construction firms, hence strict compliance with standard material control strategies is maintained only by large construction firms. However, it was concluded that the recognition of material control and implementation of the strategies involved by building construction firms would minimize delays, disputes, avoid project abandonment as much as possible, achieve effective project monitoring and control, high construction quality and productivity as well as minimize cost and time overrun in construction process as much as possible. It also enhances profitability of the contractor's organization in the Nigerian building construction industry. This is achieved through the adoption and implementation of well-articulated and cost-effective material control strategies that can guarantee increased productivity. Hence, tasks are completed within planned duration, cost and quality standard.

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